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BIRTH ATLAS

Dickinson - Belskie

FIFTH EDITION

MATERNITY CENTER ASSOCIATION
New York

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TITLE PAGE & PELVIC INLET | PLATE 1

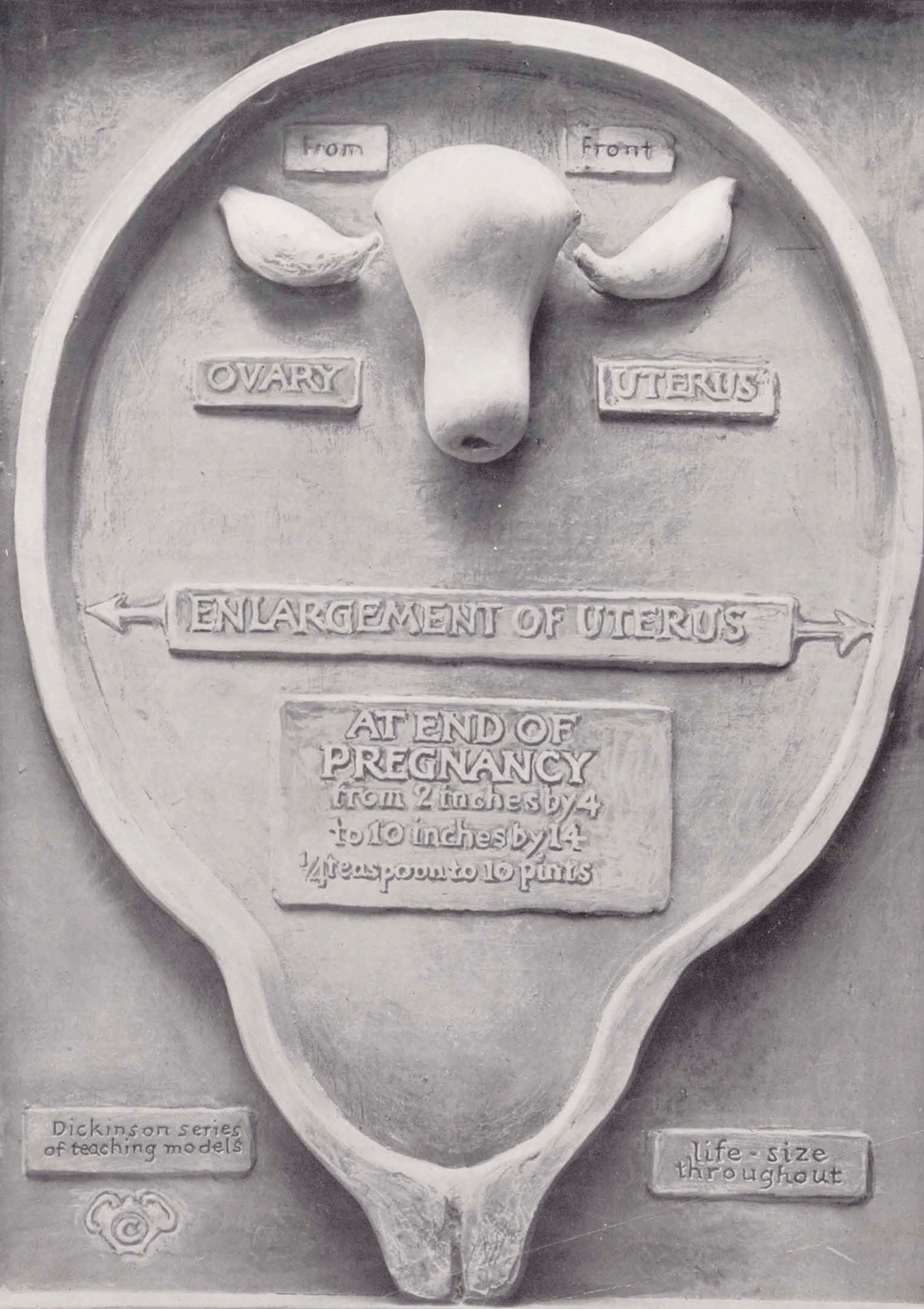
OF TWENTY FOUR SCULPTURES

ON FERTILIZATION
STEPS OF GROWTH
STAGES OF LABOR
AND INVOLUTION

ROBERT LATOU DICKINSON

ABRAM BELSKIE

MATERNITY CENTER ASSOCIATION
NEW YORK 1940



Dickinson series of teaching models

life-size throughout

BIRTH ATLAS

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48 East 92nd Street, New York, N. Y. 10028

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Second Edition, 1943, Reprinted 1946, 1947, 1948, 1950; Revised 1951
Third Edition, 1953, Reprinted 1954, 1955, 1957
Fourth Edition, 1958, Reprinted 1959
Fifth Edition, 1960, Reprinted 1961, 1962, 1963, 1964

ROBERT L. DICKINSON, M.D.
Designer and Draftsman, Modeler of Anatomy and Obstetrics

ABRAM BELSKIE, D.A.
Sculptor

MALVINA HOFFMAN
Consultant

THE BRINGING FORTH of new life is a beautiful and mysterious process from the moment sperm and ovum unite within a woman's body. At that fateful moment, the inherited tendencies of a new individual are settled forever — a person like all mankind but different from anyone who ever existed before.

The pictures in the *Birth Atlas* present a very striking illusion of the third dimension. This is achieved by photographing life-size sculptures showing the growth of the baby, step by step, from conception until birth and the slow return of the uterus to pre-pregnant position, and almost pre-pregnant size. It should be noted that the reproductions show some unavoidable photographic distortion and that some details are deliberately diagrammatic.

The line drawings are by Dr. Eva Schuchardt, the microphotographs on Plate 3 by Dr. Landrum B. Shettles, and the photograph of the newborn baby by Mr. Percy Brooks.

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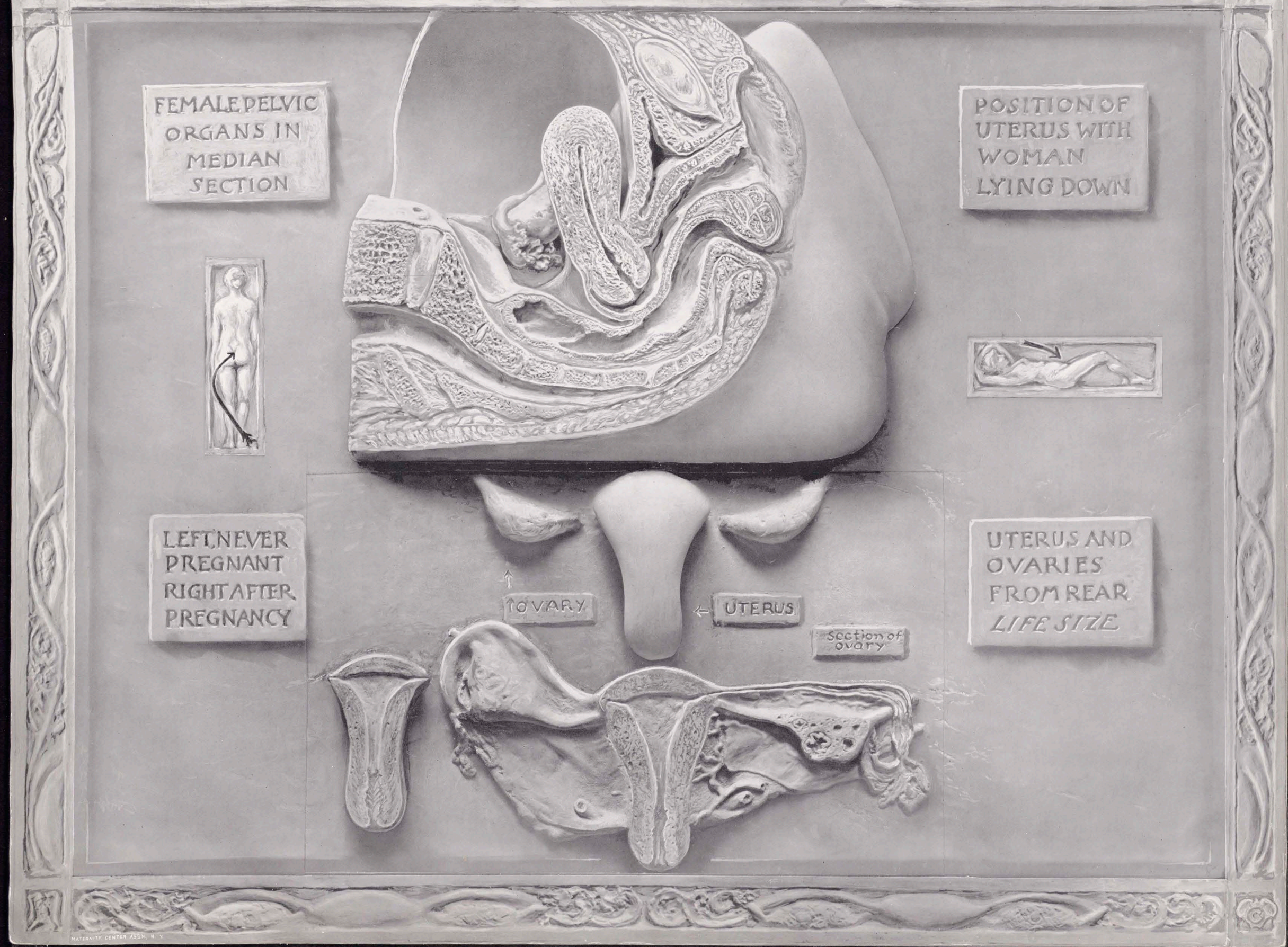

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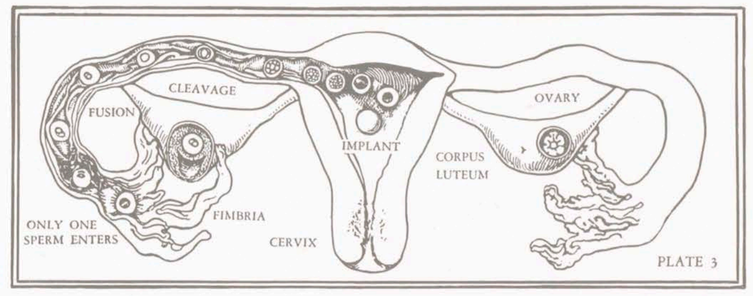
INSEMINATION: OVULATION: MEETING OF SPERM AND OVUM

Plate 3



LIVING HUMAN OVA PHOTOGRAPHED BY PHASE CONTRAST MICROSCOPE

This series of microphotographs (greatly enlarged) by

DR. LANDRUM B. SHETTLES of Columbia-Presbyterian Medical Center, New York

1. The ovum very recently released from an ovary and completely surrounded by corona radiata cells.
2. The ovum almost completely denuded of corona radiata cells as it is moved down the oviduct. These cells feed the ovum through the tiny root-like tubular processes which can be seen in this picture.
3. The ovum has released its first polar body, showing that it is mature.
4. Several spermatozoa have penetrated the zona pellucida — the outer translucent covering of the ovum — but only one spermatozoon reaches the nucleus to accomplish fertilization.
5. As a sign that fertilization has taken place, the ovum releases its second polar body.
6. Thirty hours after fertilization — the ovum at the two-cell stage of division.
7. Within three days a cluster of cells has developed which has not yet become attached to the wall of the uterus.
8. The same cluster of cells in Figure 7, with adjustment of light in microscope to show third dimension.

A NEW LIFE BEGINS in the union of two tiny cells — the spermatozoon and ovum. Ova are the largest cells in a woman's body, but each ovum is only as large as the tiniest grain of sand. The male companion cell — the sperm — is much smaller. It can be seen only under a strong microscope.

Small as these two cells are, each has countless genes within the twenty-three chromosomes of its nucleus. Genes are tiny bodies which carry to the baby his heritage from all his ancestors since time began. Each baby's unique combination of genes is what accounts for his inborn differences from all other people — even those in his own family, except an identical twin.

The male seminal fluid is deposited within, at, or near the entrance of the vagina. The millions of tiny sperm immediately start moving toward their goal, an ovum in the oviduct.

They begin their long journey together but as they travel, the great majority falls by the wayside. Only a comparatively few vigorous sperm actually reach the ovum. It takes them from two to three hours to make the trip.

Fertilization can occur only if an ovary has released an ovum at about this time, and this ovum is met by sperm in the outer third of the oviduct. Many sperm are attracted to the ovum, but only one unites with it. The others may have served as helpful escorts or perhaps they are but unsuccessful rivals in the race. They soon disintegrate and disappear.

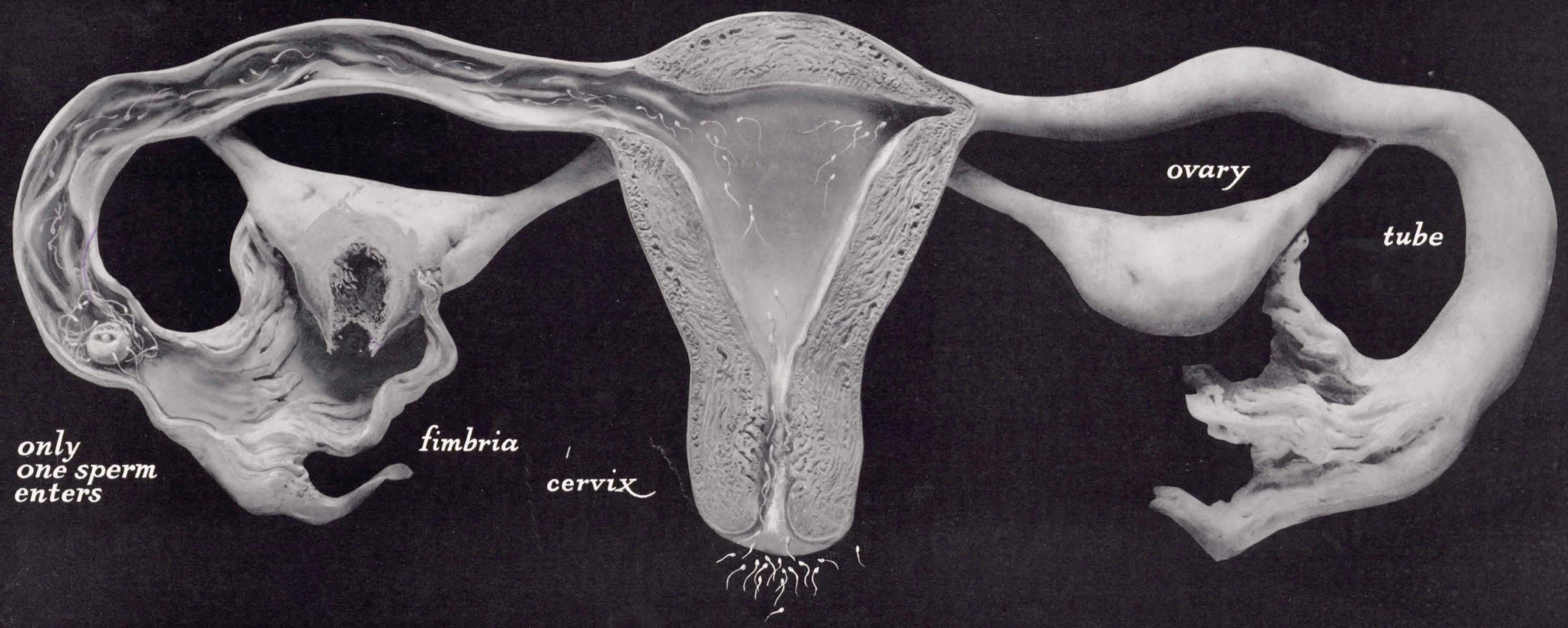
Timing is important in fertilization, which normally happens when an ovum meets a sperm within twenty-four hours after ejaculation, or is joined by sperm within eight hours after the ovum was released from the ovary. The fertilized ovum is then moved down the oviduct to the uterus. During its journey, it divides and re-divides to form a tiny cluster of cells.

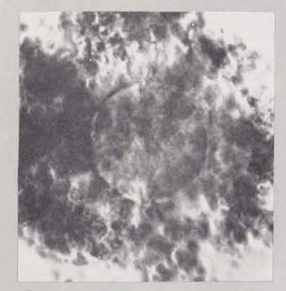
Each month, the uterus makes careful preparation for the reception of this tiny mass of cells. It builds up a thick soft lining, well-stocked with nutritious material so the little clump of cells can send its root-like projections into the lining to absorb its food from its mother's blood stream.

If the ovum is not fertilized, it goes to pieces and disappears. The uterus sheds its lining containing all the store of food prepared in advance but not needed. This is menstruation. As soon as menstruation is completed, the uterus starts to build a new lining in preparation for the ovum that will mature and perhaps be fertilized next month.

INSEMINATION : OVULATION : MEETING OF SPERM AND OVUM

BIRTH ATLAS No. 4
PLATE 3

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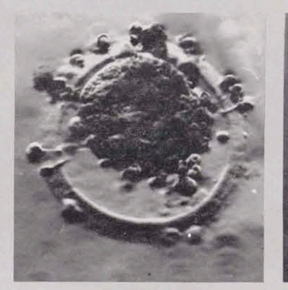
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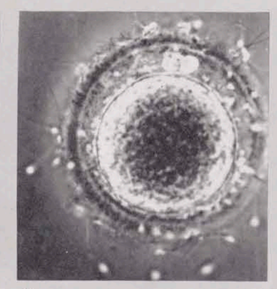
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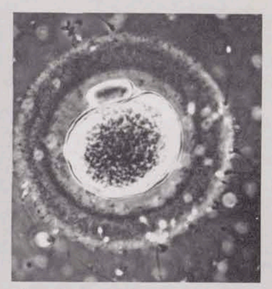
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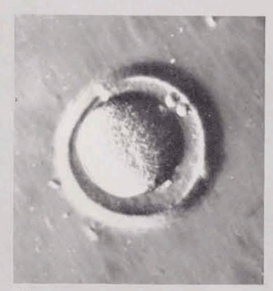
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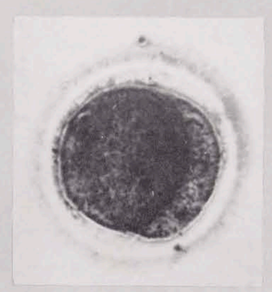
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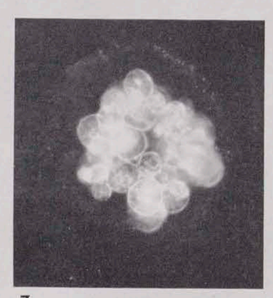
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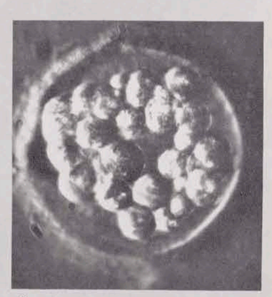
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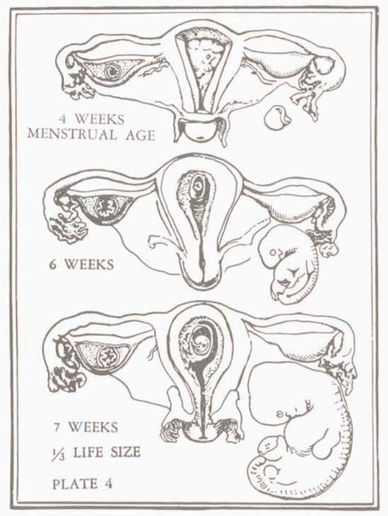
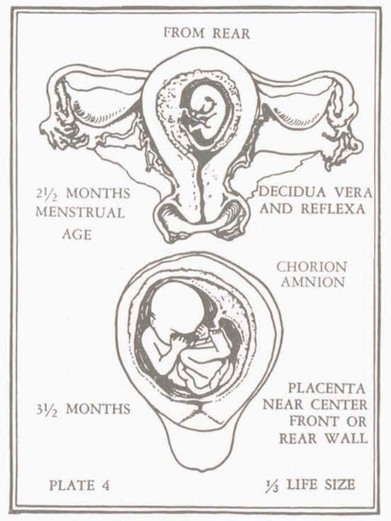
EARLY WEEKS OF DEVELOPMENT

Plate 4



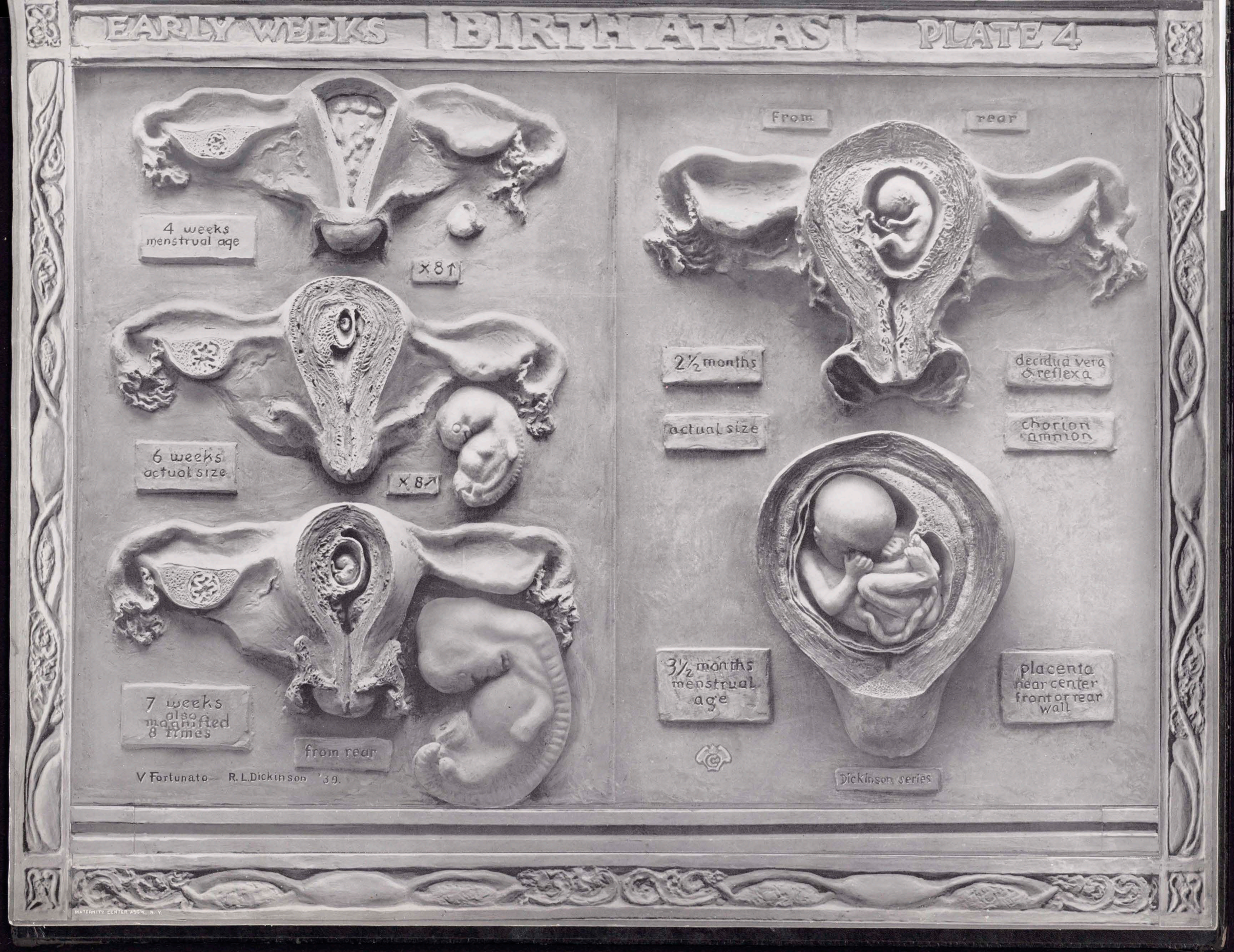


In Plate 4, the baby develops from 4 weeks to 3½ months of age (life-size). By the time the baby is 4 weeks of age, the foundation of all his organs has been laid. During the next two weeks, the wall of the uterus thickens, the beginning of many changes it will undergo during the next eight months. Beginnings of the placenta can be seen at 6 weeks, and the baby floats in a small oval double-membrane sac, the amniotic sac, which is filled with fluid. This fluid protects the baby from jars and jolts as his mother moves about, and it provides a medium in which he can move easily. Even at this early stage, his heart has begun to beat.

By the seventh week, tiny buds for arms and legs have begun to appear. The umbilical cord which connects the baby and placenta is lengthening and will continue to grow, allowing freedom of movement. The placenta is larger and able to perform its increasing task of transferring nourishment from the mother's blood stream to the baby's, and waste products from his blood stream to hers.

At two and one-half months, the baby's arms and legs are lengthening. His body and head continue to develop. The walls of the uterus continue to become thicker, and the glands of the cervix are more active.

When the baby is a month older, he occupies the whole capacity of the uterus and the uterine wall begins to stretch as he continues to grow. This ability of the wall to stretch gives the baby enough space to exercise and grow. He really looks like a baby by now — cuddled up warm and snug.


EARLY WEEKS
BIRTH ATLAS
PLATE 4
4 weeks menstrual age
×8↑
6 weeks actual size
×8↗
7 weeks also magnified 8 times
from rear
V Fortunato R. L. Dickinson '39.
from
rear
2½ months
actual size
decidua vera & reflexa
chorion amnion
3½ months menstrual age
placenta near center front or rear wall
Dickinson series

THE BABY IS CRADLED IN THE BONY FRAMEWORK OF THE PELVIS

Plate 5

THE BABY at about 5 months can be seen protected by the bony framework of his mother's pelvis — but as he grows, the uterus extends upward into his mother's abdomen without disturbing her body's normal functions.

SYM. SYMPHYSIS
V. VAGINA
T. I. TUBEROSITY OF ISCHIUM
A. ANUS
M. MEATUS

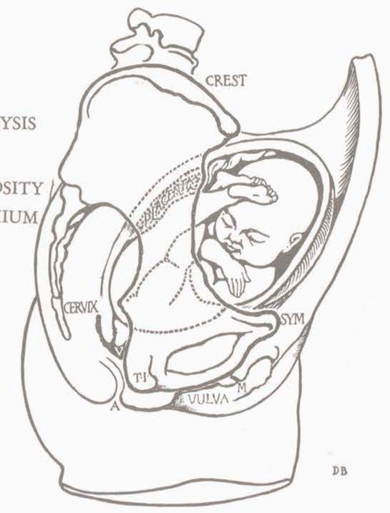
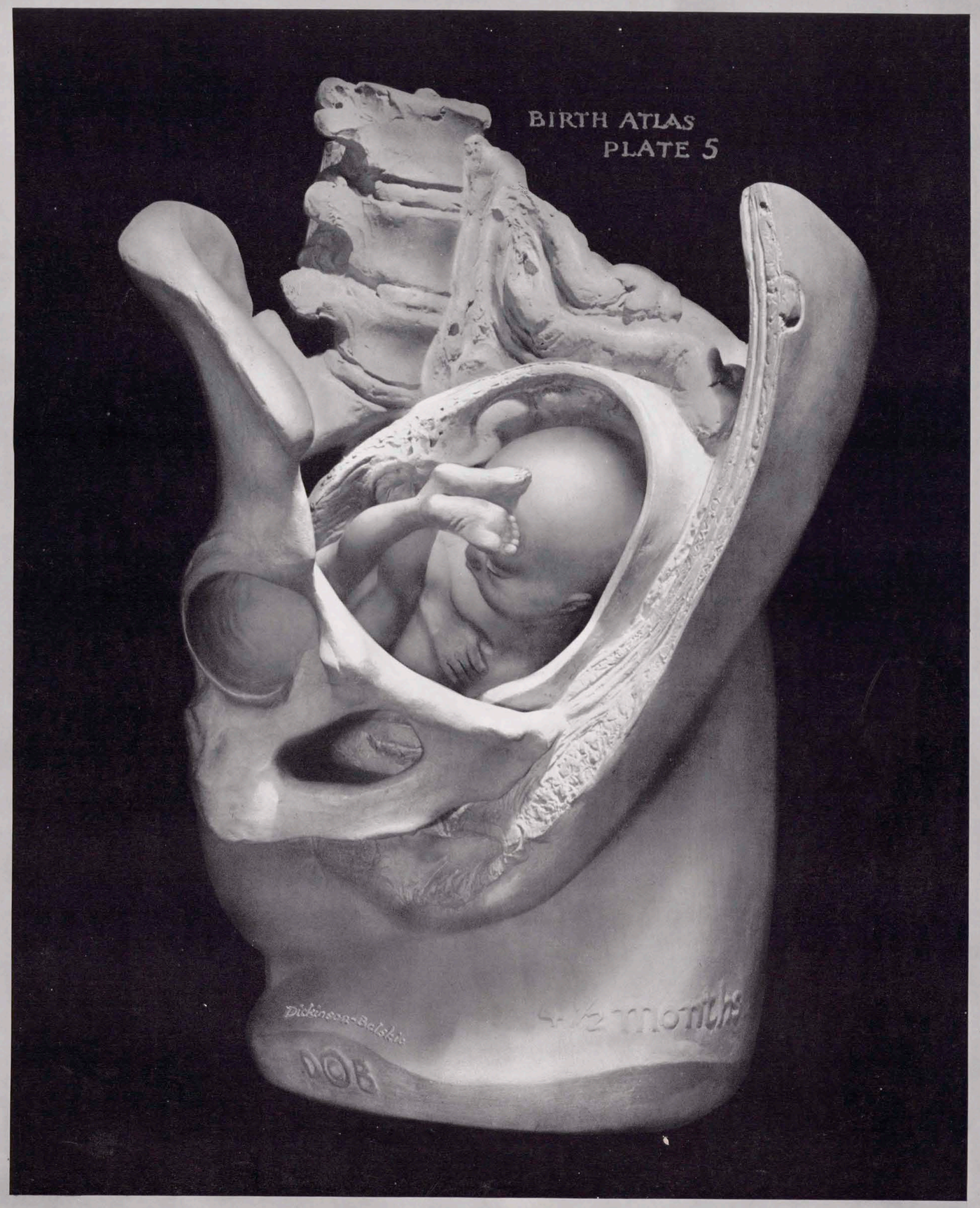


PLATE 5



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THE BABY AT SEVEN MONTHS

Plate 7

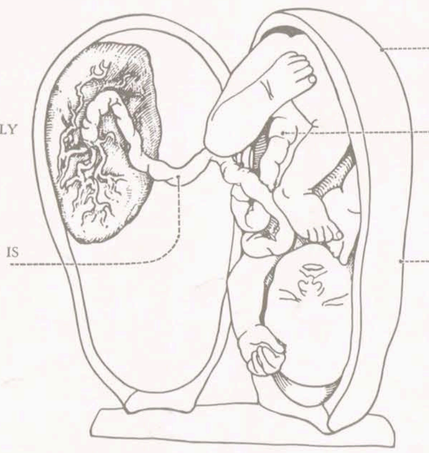
THIS BABY LOOKS PLUMP and full grown but he is far from ready for birth. His temperature regulating mechanism is not well developed. His resistance to infection is low. Often his sucking reflex is immature or he is too small and weak to nurse. If born, he could live but would find the adjustment to his new environment very difficult. All of this means that he may have to be in an incubator and will need a great deal of nursing care. It would be better for him to stay in nature's incubator for the full nine calendar (10 lunar) months.

PLATE 7

AT SEVEN MONTHS, THE BABY STILL LOOKS OLD AND WRINKLED. HE IS LIKELY TO LIVE IF BORN AT THIS TIME AND GIVEN PROPER CARE.

⅓ LIFE SIZE

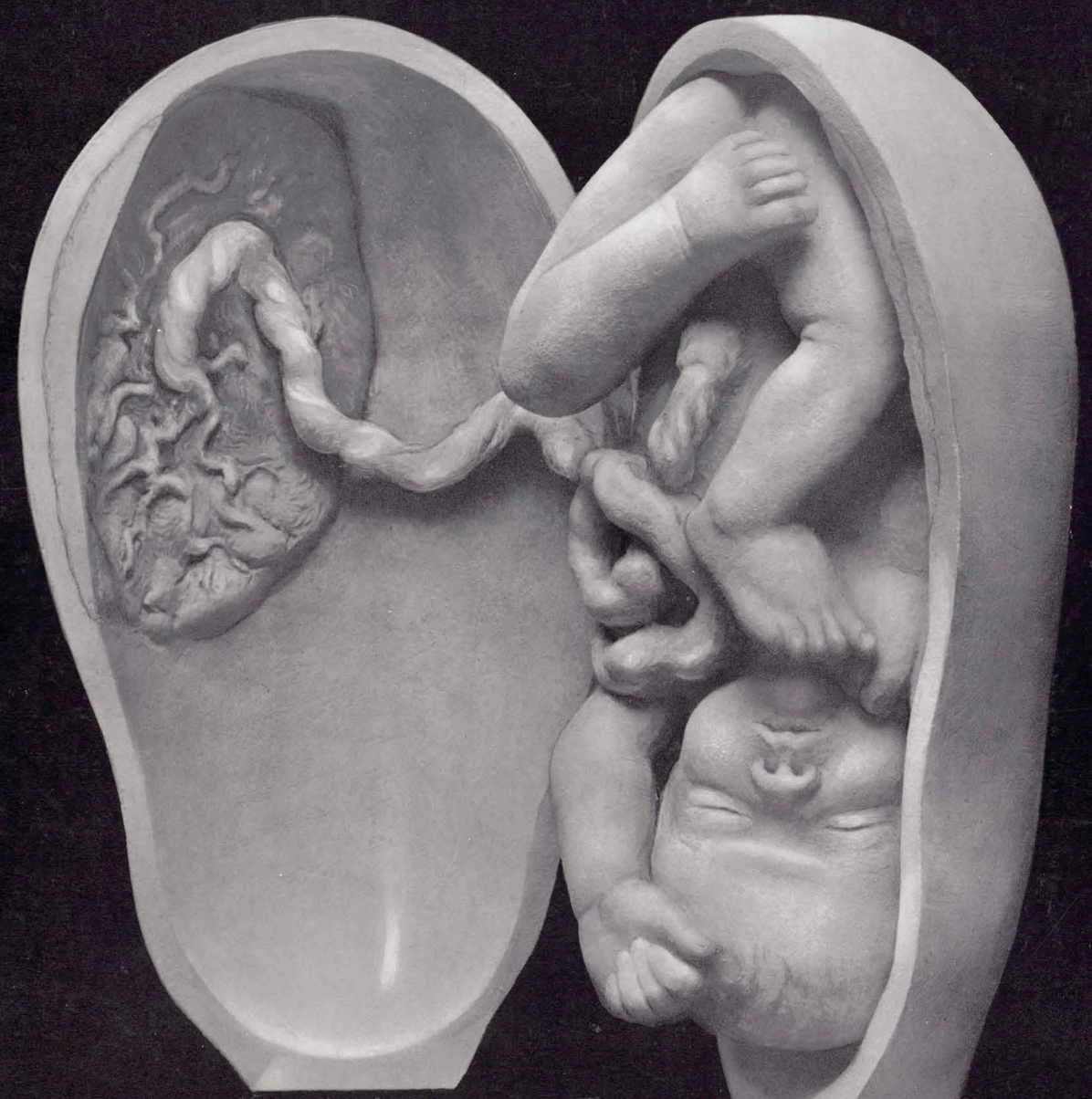
MEMBRANES NOT SHOWN



SEVENTH MONTH

BIRTH ATLAS Nº 12
PLATE 7

PLACENTA OPPOSITE BABY



A Delsrie
R L Dickinson

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LABOR

Plates 8 through 12

BECAUSE A MOTHER *works* to bring her baby into the world, the whole process is called labor. The longitudinal muscles of the uterus begin to contract and retract. The baby is pressed against the internal opening of the cervix. This helps to stretch the cervix so the baby can pass through. When the time comes for the mother to begin to work with the uterus during each contraction, she has an irresistible urge to help push the baby on his way. She works only so long as the urge lasts. When the uterus relaxes, she relaxes and rests, too.

No two labors are exactly alike. Sometimes the contractions are long and strong and the rest periods short. Then again, the contractions may be short and not so strong and the rest periods long. Sometimes the membranes rupture early; at other times they remain intact. Some babies are large, some are small; some come head first and some come feet first. Some can be moved along the birth canal more readily than others. But the basic process is always the same — the cervix is stretched, then the mother, working with the uterus, pushes the baby through the birth canal and into the world.

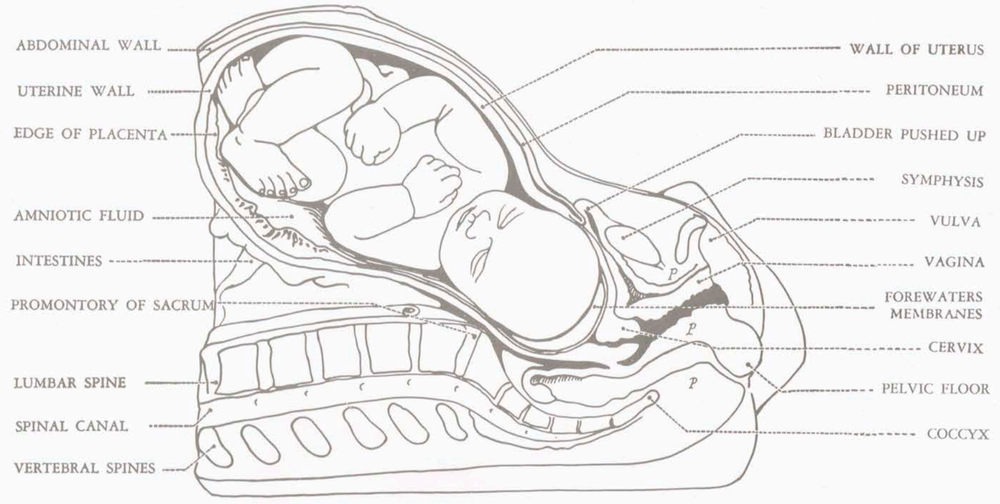
BEFORE LABOR BEGINS

Plate 8

LABOR IS ABOUT READY TO BEGIN. The baby is facing the right side of his mother with his arms and legs flexed. This is a typical and usual position. The baby has descended slightly into the pelvis and his head is crowding the pelvic organs. It looks big in relation to the birth canal, but it adjusts beautifully as labor progresses. The baby's skull bones have not yet grown together. Their edges begin to slip over each other so his head becomes molded to the available space.

Note that the cervix is long and thick and the membranes are still intact.

AT TERM: THICK PELVIC FLOOR,
CERVIX CLOSED, UTERUS RELAXED



BEFORE LABOR BIRTH ATLAS PLATE 8

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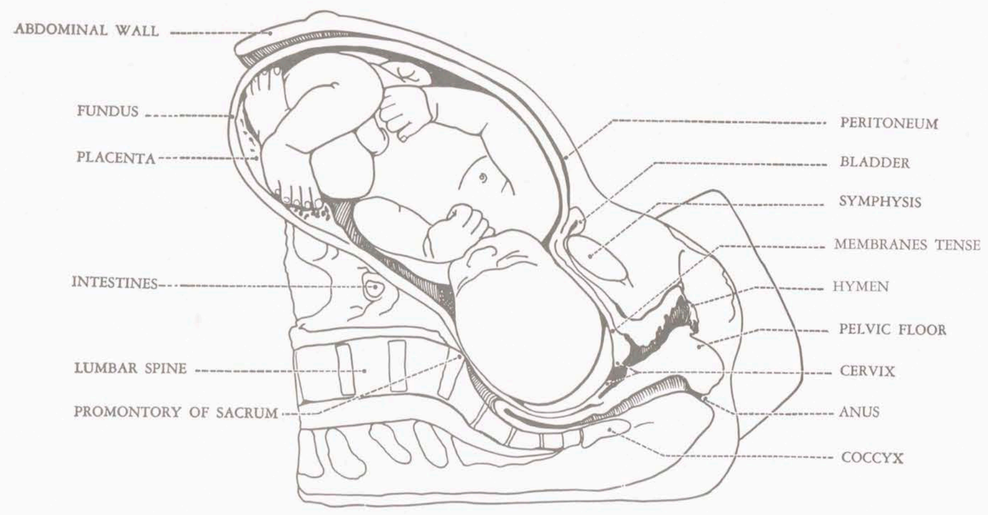
LABOR—FIRST STAGE

Plate 9

LABOR HAS BEGUN. The baby's position is gradually changing to accommodate the largest diameters of his body to the largest diameters of the pelvis. He is being moved deeper into the pelvis and is beginning to face his mother's back. The mother's bladder and rectum are being crowded. The cervix is almost completely effaced (thinned out), but it has not yet begun to dilate.

IN LABOR: UTERUS IS CONTRACTING,
CERVIX DILATING, BAG OF WATERS BELOW HEAD



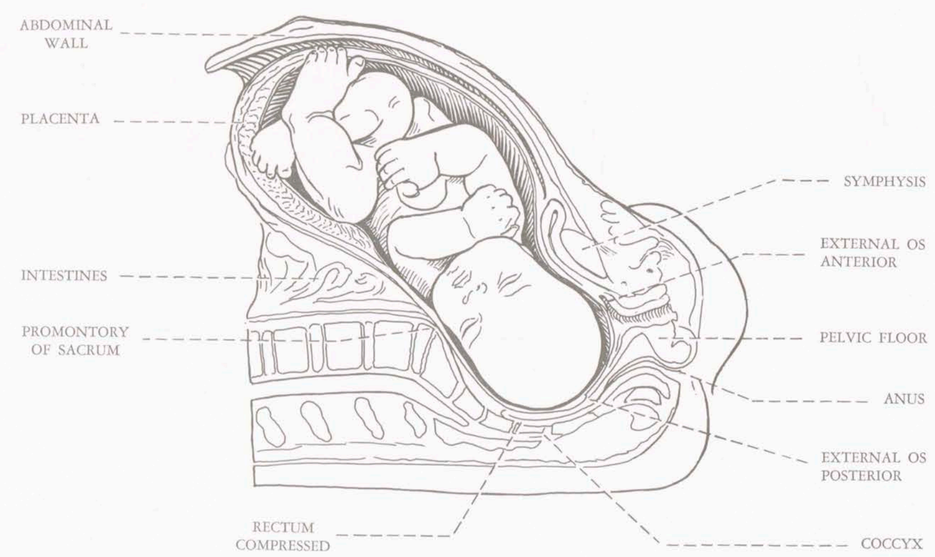
LABOR · CERVIX DILATING & BAG OF WATERS PLATE 9

LABOR—FIRST STAGE

Plate 9A

THE BABY'S HEAD has turned so slight molding can be seen. The cervix has been completely effaced and the uterine outlet is now opening (the cervix is dilating). Its margins can be seen below the symphysis and above the coccyx.

LABOR: UTERUS CONTRACTING; CERVIX CONTINUING TO DILATE



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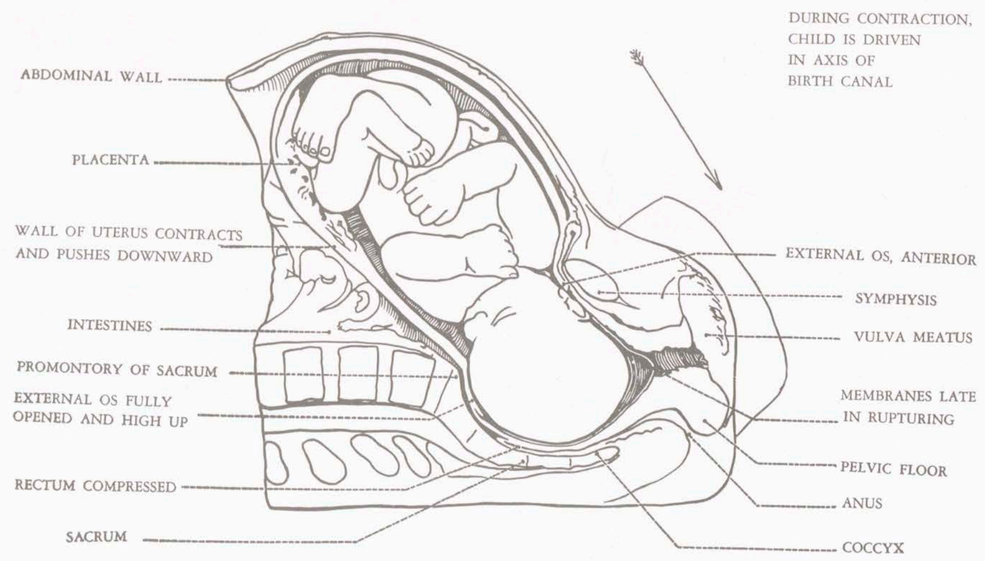
LABOR—SECOND STAGE

Plate 10

THE CERVIX is now open enough to permit the baby to begin his passage down the birth canal. His face is continuing to turn toward his mother's back. In this picture, the membranes are still intact and bulging in front of the baby's head.

LABOR: HEAD DEEP IN BIRTH CANAL; PULL OF UTERINE CONTRACTIONS DRAWS CERVIX UP



FULL DILATION CERVIX HIGH HEAD DEEP IN PELVIS PLATE 10

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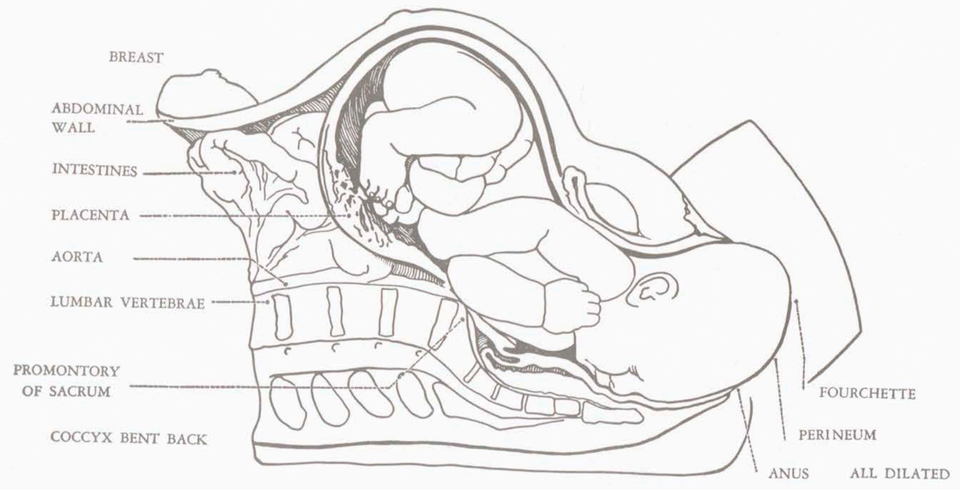
LABOR—"CROWNING" OF BABY'S HEAD

Plate 11

LABOR IS ALMOST OVER. The amniotic sac has ruptured and the baby is being pushed down through the birth canal by the combined force of the uterine contractions and his mother's voluntary bearing down efforts. The crown of his head can be seen at the outlet of the vagina. His face is turned completely toward his mother's back and his shoulders are beginning to rotate. The mother's perineum is stretched and bulges over the invisible portion of the baby's brow and head.

LABOR: HEAD BEGINS TO APPEAR;
MUSCLES OF ABDOMINAL WALL CONTRACT;
PELVIC FLOOR BECOMES EXTREMELY THIN



ABDOMINAL MUSCLE DRIVE PELVIC FLOOR THIN PLATE 110

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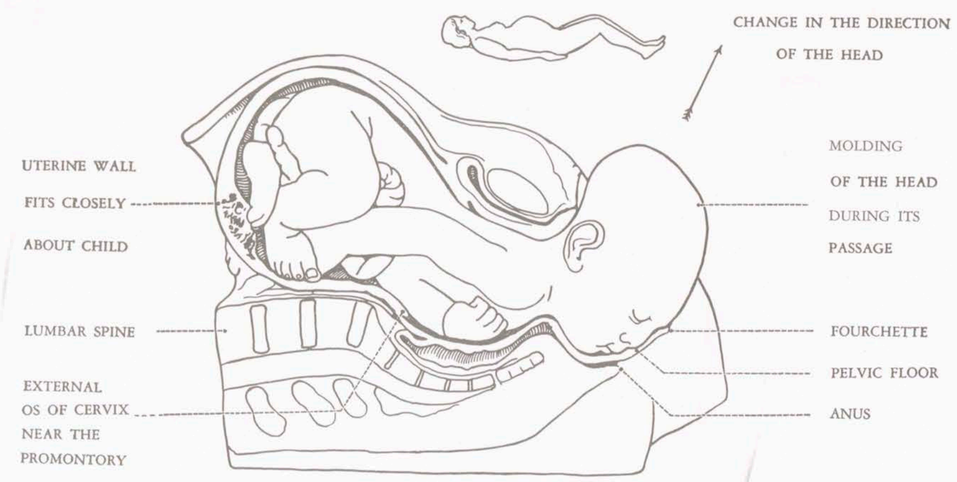
LABOR—SECOND STAGE NEARLY COMPLETED

Plate 12

THE BABY'S HEAD EMERGES. The mother's perineum is shrinking and thickening. The baby's body continues to be turned. The thickening wall of the uterus fits cap-shape over his buttocks.

LABOR: HEAD TURNS UPWARD;
PELVIC FLOOR SLIPS BACK OVER FACE



HEAD TURNS UPWARD PELVIC FLOOR RETREATS PLATE 12

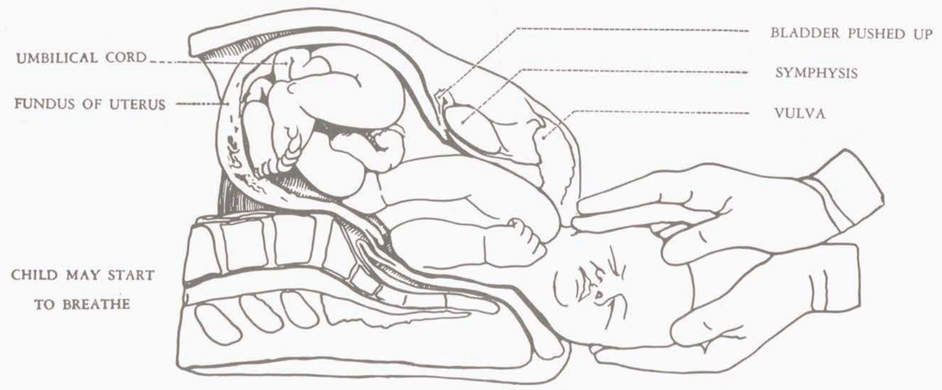
MATERNITY CENTER ASSN. N. Y.

BIRTH

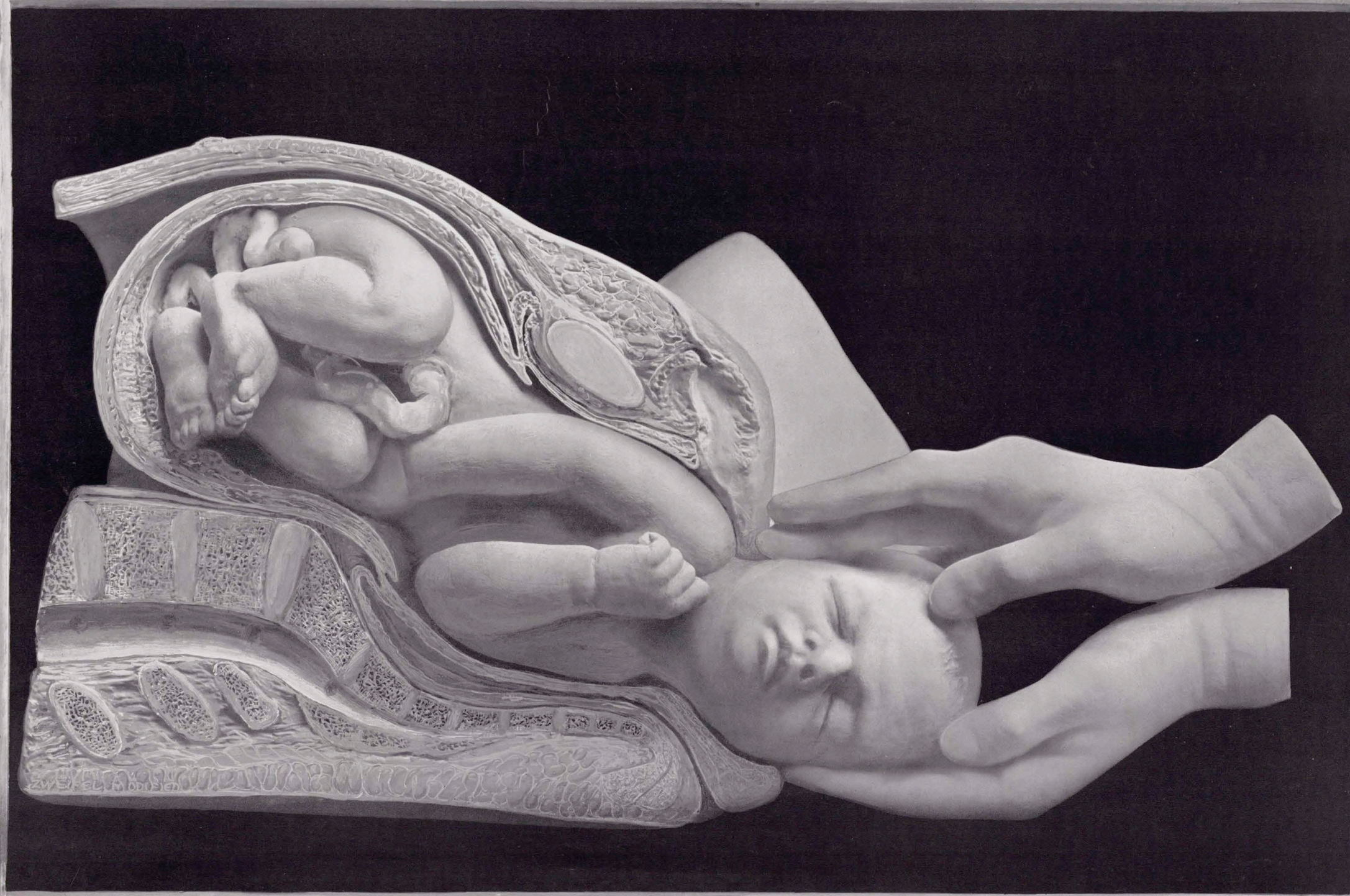
Plate 13

AFTER THE BABY'S HEAD emerges, it turns as the shoulders are rotated. The right shoulder can be seen as it turns under the symphysis. The baby's head is gently and firmly supported by the attendant. As contractions continue, the head is guided upward over the receding and thickening perineum, and the rest of his body slides out.

The baby is born!



BIRTH OF SHOULDERS ROTATION PLATE 13



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EXPULSION OF PLACENTA—THIRD STAGE OF LABOR

Plate 14

AFTER THE BIRTH OF THE BABY, the uterus continues to contract, the walls become thicker and the cavity gets smaller. Since the placenta and membranes cannot contract, and the place of attachment on the uterine wall is getting smaller, they are separated and expelled.

PLACENTA AND MEMBRANES SEPARATING

⅓ LIFE SIZE

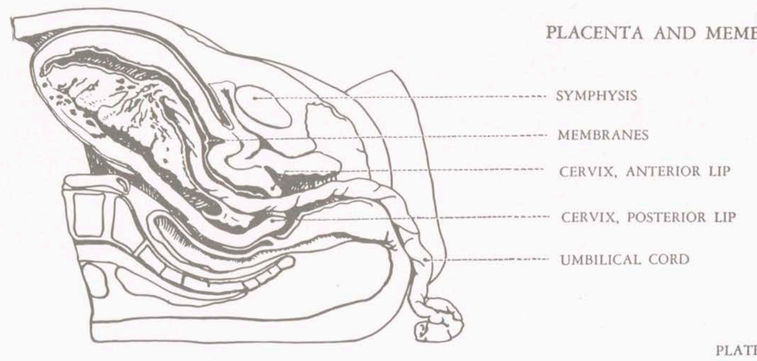


PLATE 14

UTERUS EMPTY

AFTER EXPULSION OF PLACENTA

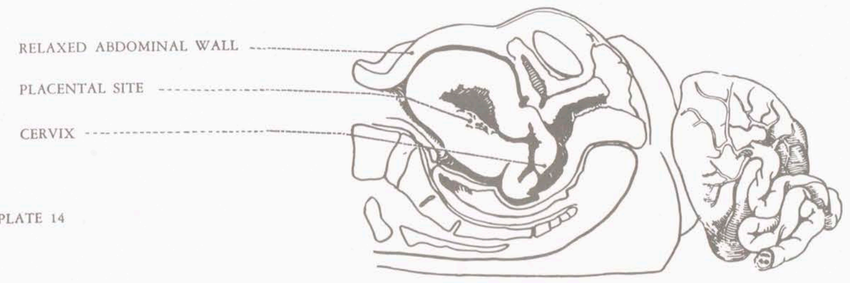
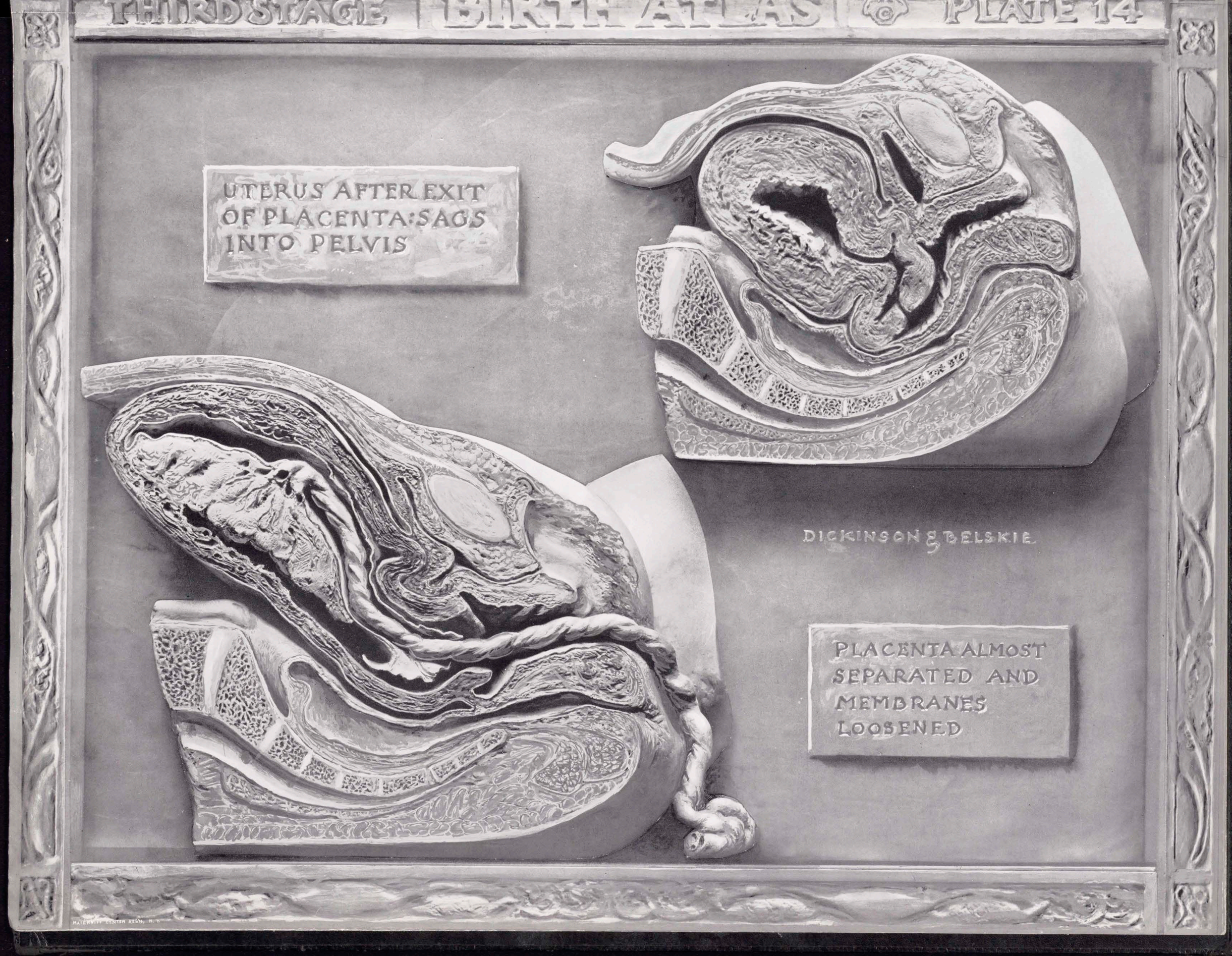


PLATE 14


UTERUS AFTER EXIT
OF PLACENTA: SAGS
INTO PELVIS
DICKINSON & BELSKIE
PLACENTA ALMOST
SEPARATED AND
MEMBRANES
LOOSENED

INVOLUTION

Plate 15

THE MARVELOUS and rapid return of the uterus to very nearly its pre-pregnant size and position is shown in the two pictures on this Plate.

FIFTH DAY AFTER LABOR

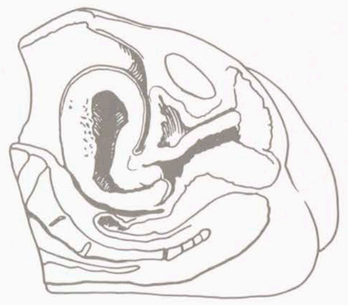


PLATE 15

⅓ LIFE SIZE

FIFTEENTH DAY AFTER LABOR:

FIFTH DAY AFTER LABOR
INVOLUTION UNDER WAY
MEDIAN SECTION

FOURTEENTH AFTER LABOR
SLOW SHRINKAGE OF UTERUS.
IF EXERTION IS EXCESSIVE
DISPLACEMENT & PROLAPSE

MATERNITY CENTER ASSOCIATION

NEWBORN BABY

Plate 16

THE BABY IN THIS PICTURE is just a few moments old. If labor was hard work for his mother, birth has been an equally difficult experience for him. He was settled comfortably in his mother's uterus where all his needs were met, when suddenly the walls of his house began to press in upon him, and to force him out through a narrow passage. He was ejected into a cold world with bright lights and harsh sounds. Circulation in his umbilical cord suddenly stopped and he had to breathe for himself — or perish.

The new baby weighs about seven pounds — more or less. He is about twenty inches tall. His head is very large in proportion to the rest of his body. His arms and legs are short and his bones are soft. His muscles are still soft and flabby, but he puts them to work at once wiggling and squirming. His skin may be red and mottled. It is usually covered with a creamy substance — *vernix caseosa.*

The newborn baby's five senses are not yet fully developed. His eyes can distinguish light and shadow. His sense of touch is not developed at his finger tips, so he explores his world with the palms of his hands. He responds to sound. His best developed sense is taste and he reacts to sweet, sour, bitter and salt.

This baby has most likely been sucking his thumb for a long time in his mother's uterus so when he is born, his sucking reflex is well developed. He will nurse immediately after birth when put to his mother's breast.

MATERNITY CENTER ASSN., N.Y.

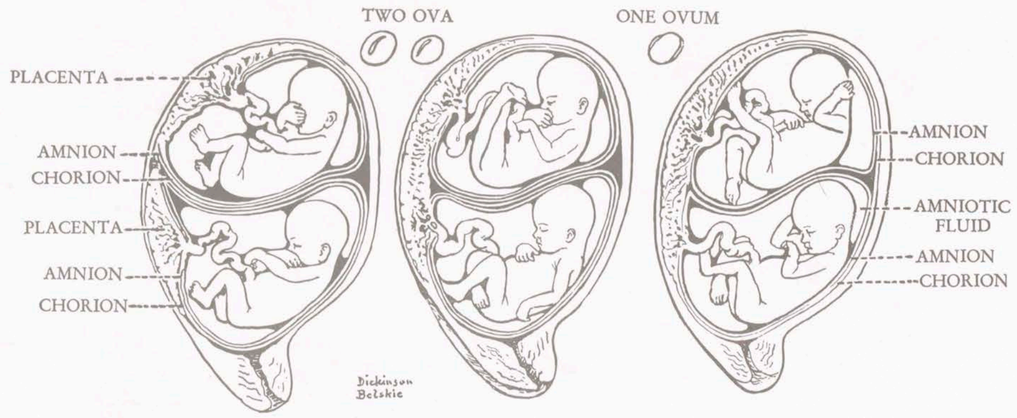
Photograph by Percy W. Brooks at The New York Hospital

TWINS

Plate 17

THERE ARE TWO KINDS OF TWINS — *fraternal* and *identical*. The two little babies on the left of Plate 17 are *fraternal* or two-egg twins. They developed from two separate ova, fertilized by two separate sperm. Each twin has its own double-membrane sac and placenta. They may be of the same or different sex. Fraternal twins are not necessarily more alike than any other brother or sister. The babies in the center picture are also fraternal twins. In this case, the two placentas have grown together.

The babies on the right are *identical* or one-egg twins. They developed from one ovum and were fertilized by the same sperm. There is only one outer membrane (chorion) shared by both babies, but each baby has his own inner membrane (amnion). They share the same placenta. Identical twins are always the same sex and each is the mirror image of the other.



FRATERNAL TWINS	FRATERNAL TWINS	IDENTICAL TWINS
Two-Egg Twins	Two-Egg Twins	One-Egg Twins
Two Placentas	The Two Placentas	Single Placenta
Each Fetus With Two Sacs	Have Merged: Each Fetus	Each Fetus Has Inner
Amnion Within Chorion	Has A Double Sac	Sac But Outer Sac Single
Sex May Be Different	Sex May Be Different	Sex Must Be Same

TWINS BIRTH ATLAS PLATE 17
TWIN NING
DICKINSON
BELSKIE
TWO EGG TWINS
TWO PLACENTAS
EACH FETUS WITH TWO
SACS AMNION INSIDE
AND CHORION OUTSIDE
SEX MAY BE DIFFERENT
FRATERNAL TWINS
TWO EGG TWINS
TWO PLACENTAS
HAVE MERGED EACH
FETUS HAS BOTH MEM
BRANES AMNION AND
CHORION SEX MAY BE
DIFFERENT
ONE EGG TWINS
ONE PLACENTA EACH FETUS
WITH INNER SAC (AMNION)
SINGLE OUTER MEMBRANE
(CHORION) ENVELOPS BOTH
SAME SEX IDENTICAL
TWINS
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